

November 14, 2003

Marlene H. Dortch, Secretary
Federal Communications Commission
Office of the Secretary
445 12th Street, SW
Washington, DC 20554

Re: *Progeny LMS, LLC Petition for Rulemaking to Amend Part 90 of the Commission's Rules Governing Location and Monitoring Service To Provide Greater Flexibility, RM-10403.*

ExParte Presentation

Dear Ms. Dortch:

Progeny LMS, LLC ("Progeny") hereby responds to several *ex parte* comments in the record of the above-captioned proceeding. Having filed the rulemaking petition that is the subject of this record, Progeny continues to believe that a rulemaking proceeding is the way to develop a full record on the important issues raised. In fact, the intervening period of more than 18 months since Progeny's petition was filed has served to highlight the need for the Commission to revisit rules and methods for sharing between licensed and unlicensed spectrum users. Moreover, this period has also seen the addition of important regulatory and technical tools, provided through the work of the Commission and its staff, which can and should be employed through a rulemaking in this band.

The full importance of such an LMS proceeding should be seen in the context of the larger issue of broadening the Commission's spectrum management policies to accommodate the welcome growth of unlicensed networking technologies—while also promoting, via transparent, technologically driven sharing criteria, the public interest in licensed services. A notice of proposed rulemaking (NPRM) in this docket would give the Commission an ideal vehicle to build a comprehensive record that would guide it in this necessary and important task. Conversely, Progeny submits that inaction would undermine the public's interest in updating regulations to maximize the benefit of spectrum resources.

Progeny has fully outlined and detailed its request for a re-examination of the LMS rules in the 902-928 megahertz (MHz) band. Moreover, it has bolstered its arguments with an expert technical analysis in its White Paper placed on the record a year ago. It continues, even in this

ex parte submission, to respond to all serious and substantive concerns and questions submitted by the parties who have commented on these issues.

As Progeny has stated in its petition and in its other submissions, a re-calibration of the LMS rules would foster the development of a technology that can provide valuable and productive products and applications for, among other public services, public safety and homeland security. The propagation characteristics of this 900 MHz spectrum make it ideally suited for the kinds of innovative public safety services that consumers and government agencies need. These services, however, must incorporate a high level of reliability to be of maximum value to the public. The Commission's licensing rules are instrumental in affording consumers assurance of that reliability.

In its White Paper, Progeny has demonstrated that the rule changes it is seeking can be implemented in a manner that will minimize the potential interference to Part 15 devices. In fact, as the analysis in the White Paper indicated, LMS operations would pose no greater interference risk than that posed by other Part 15 devices themselves.

A Rulemaking Would Address Sharing Issues

The issues presented in this proceeding are relevant to many other bands in addition to the 902-928 MHz band. At stake is the Commission's approach to reconciling the needs and rights of existing licensees, while paving the way for accommodating burgeoning unlicensed services in multiple bands, across the wireless spectrum. The 902-928 MHz band is not the sole band now being utilized for unlicensed wireless devices. A rulemaking proceeding here offers the Commission the opportunity, in the public interest, to lay down an updated technical and regulatory framework for spectrum sharing between licensees and unlicensed users. The development of unlicensed technologies coincides with the development of newer, more flexible spectrum management techniques that emphasize technological solutions to potential interference and de-emphasize more traditional—but often more regulatorily burdensome—techniques such as use restrictions and rigid spectrum caps. It is precisely such older, more burdensome spectrum management provisions that Progeny has asked the Commission to review and revise in this instance.

In several recent proceedings, the Commission has correctly noted that regulatory flexibility and market forces can work in tandem to promote efficient spectrum use. In a separate statement on the order setting service rules for advanced wireless services in the 1.7 gigahertz and 2.1 GHz bands, Chairman Powell noted that the new rules “reflect several key principles for efficient use of spectrum,” including “maximizing the flexibility of licensees to choose the types and characteristics of the services that they will offer in their licensed spectrum.” This is precisely the kind of flexibility Progeny is seeking through a rulemaking proceeding. Its goal is echoed in Chairman Powell's statement, referring to the advanced wireless services order, that an “emphasis on flexibility, compatibility and clear definition of rights, demonstrates how better rules can create better, more reliable, more affordable services for American consumers.”¹

¹ *In the Matter of Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands*, Report and Order, WT Docket No. 02-353, Rel. October 16, 2003, Statement of

Relief Sought by Progeny

Certain aspects of the relief requested by Progeny address wholly outdated regulatory practices, such as spectrum caps and service restrictions. The Commission has rejected these practices in more recent proceedings. No party or commenter has provided a substantive, technically verifiable reason why elimination of these outdated regulations should not be explored through a rulemaking proceeding:

1. *Elimination of the anti-duopoly provisions.* Today, an LMS service provider can only hold up to 8 MHz of the LMS spectrum allocated in the band under an FCC-mandated spectrum cap. This cap represents outdated FCC policy that the FCC abandoned when it lifted spectrum aggregation limits on vastly larger licensees such as cellular providers. Progeny is not, however, seeking any expansion of the portion of the band allocated for multilateration LMS. Nearly half of the band (about 46 percent) is devoted to non-multilateration LMS and is not even at issue in this request.
2. *End the LMS service requirement.* Progeny asks that the service restriction confining licensees to the current narrow definition of LMS be eliminated. Almost a decade has elapsed since this service was defined. Current FCC policy is to allow licensee users to use their spectrum in any manner that serves customers best, so long as licensees meet non-interference criteria. Further, with E911 service now a mandate for cellular providers—and with GPS a globally available “free” locational service—the narrow market for LMS, as earlier envisioned, does not exist.

Two additional requests address rule provisions that were designed to minimize the amount of LMS traffic as a way to forestall *feared* harmful interference. These are blunt regulatory instruments that can and should be replaced with technical rules and techniques that concretely solve real interference occurrences.

3. *Eliminate Rule 90.353(d).* Reviewing this provision of the FCC’s rules is central to the viability of LMS in the band. Section 90.353(d) requires Progeny to prove in field tests that its equipment does not interfere with any unlicensed service in the band. This restriction is so unwieldy as to completely eliminate LMS as a viable service. It is impossible to prove a negative, particularly when unlicensed users in the band do not even have to reveal their presence. This rule has had an absolutely chilling effect on investment.
4. *Eliminate the no-interconnection restriction.* The rules now include a prohibition against interconnection with the public switched network. Such bans on interconnection are an anachronism, especially in this case, when Internet Protocol technology can be employed for LMS messaging.

Recent Filings in the RM-10403 Proceeding

Finally, Progeny wishes to respond to various recent *ex parte* filings in the RM-10403 docket, as follows:

- On November 5, 2003, WaveRider Communications, Inc. (“WaveRider”) filed *ex parte* letters in the above-captioned proceeding, reflecting meetings held by WaveRider representatives with several staff members in offices of the Commissioners. In the attached Appendix A, Progeny responds in detail to the technical issues raised by WaveRider. In brief, however, WaveRider’s claim that the 902-928 MHz band is driving unlicensed is patently false. Most major suppliers of Part 15 networking devices are moving rapidly to the 2.4 gigahertz and 5 GHz bands. Indeed, the Commission in recent days adopted an order implementing an additional allocation for unlicensed use at 5 GHz, reflecting a global allocation at the 2003 World Radiocommunication Conference.
- On August 6, 2003, the American Public Power Association (APPA) submitted an *ex parte* letter opposing the commencement of a rulemaking. APPA provides no technical analysis to substantiate its fears concerning the development of licensed operations in the band. APPA notes that 75 percent of its members serve rural and small communities, where interference from LMS operations is even more unlikely due to geographically dispersed usage. Moreover it would be in the interest of APPA’s members to establish transparent, reliable and enforceable technical standards for sharing—standards that would be the inevitable outcome of a rulemaking proceeding for this band.
- In an email submission dated October 10, 2003, Warren C. Havens and Telesaurus Holdings GB LLC suggested that Progeny pursue relief “outside a rulemaking.” It is not clear how Telesaurus believes such relief could be obtained absent a rulemaking, although it alludes to the possibility that “waivers or the like” could be warranted. Progeny believes that application for a waiver is neither possible nor appropriate in this circumstance, for the following reasons:
 - (1) Waivers must be justified by specific circumstances that apply to specific applicants and not to others; yet in this case, the barriers and burdens inherent in the current rules apply to all LMS licensees equally;
 - (2) If a waiver were to be granted exempting Progeny from standards and requirements in the FCC’s current rules, it is not clear (absent the drafting of new rules) what standards and requirements would then apply to it;
 - (3) To the extent any waiver would allow Progeny to operate based on recognition of a set of specific circumstances, it is not clear what utility or benefit there would be in retaining rules that no longer reflected those circumstances; and
 - (4) To the extent that any waiver were not permanent, this would undercut the

ability of any equipment manufacturer or investor to place any long-term reliance upon it.

In other words, if a waiver were to be granted, it is not clear under what regulatory standard (including, for example, interference mitigation), Progeny would then be required to operate. And if such an alternative standard and rules were to be provided in approving a waiver, it is not clear how this would differ from a rulemaking in anything other than name only.

- In an August 12, 2003, email included in the docket, an attorney for Itron, Inc., states the company's belief that the field testing requirement should remain for LMS systems. Itron does not explain how Progeny could practically and feasibly field-test its technology to account for unspecified numbers of unlicensed systems and devices when it has no means of determining whether, how, when or where any such systems and devices are actually in operation. More to the point, Itron has acknowledged that it makes primary use of the non-multilateration segments of the band, which would not be affected at all by Progeny's requests; that is, there is little or no overlap between the spectrum used by Itron and the spectrum allocated to licensees such as Progeny. This lack of overlap completely undercuts Itron's assertion that granting Progeny's requests would harm its operations.

Therefore, Progeny strongly urges the Commission to initiate a rulemaking proceeding to apply flexible-use and technical interference mitigation techniques in this band. A rulemaking proceeding is the best way to build the record needed for the Commission to maximize both licensed and unlicensed uses of the band, applying state-of-the-art regulatory and technical frameworks.

In accordance with Section 1.1206(b) of the Commission's Rules, please accept this original and one copy for submission.

Respectfully yours,

/s/ Janice Obuchowski
Janice Obuchowski
Of Counsel
Progeny LMS, LLC

Appendix A

Response to Issues Raised by WaveRider Communications, Inc.

Progeny LMS, LLC has analyzed the questions raised by WaveRider and presented in letters filed in this docket. The following is a point-by-point rebuttal to WaveRider's assertions.

1. WaveRider's unsupported statements regarding the nature of the LMS services and their impact on Part 15 devices.

WaveRider's comments refer to a section of the Progeny White Paper subtitled "Potential LMS Services." In this section – which begins on the first page of the White Paper – Progeny identifies the universe of services that may be offered in the LMS band, ranging from low density, "bursty" packet data systems for tracking inventory to cellular-like voice services employing voice-over-IP technology. Progeny further states that, using a conservative analysis, Progeny assumes a hypothetical LMS design of the latter type—that is, a high-density cellular-like system representing the worst-case hypothetical impact an LMS system might reasonably have on a Part 15 device.

WaveRider attempts to portray Progeny as a "sheep in wolf's clothing" that is offering up an inoffensive hypothetical network while secretly scheming to deploy a much more aggressive network. But this claim is false on its face: Progeny explicitly stated that it has selected a worst-case scenario from the universe of possible systems, precisely in order to keep the interference analysis as conservative as possible. Progeny's intention, as explicitly stated, was only to provide a reasonable and conservative framework for assessing potential interference. Oddly, WaveRider does not contest this basic point.

In the White Paper, Progeny points out that LMS spectrum represents only about half of the 902-928 MHz band. This is an important point, since Part 15 systems have no risk of LMS interference whatsoever when operating in the other half of the band. WaveRider asserts that there will continue to be an "interference problem" in the half of the band where LMS does operate. This is, of course, the very reason Progeny undertook the analysis illustrated in the White Paper: to replace untested assertions with thorough technical analysis. Here again, WaveRider is unable to counter the essential finding of the White Paper, which is that even a hypothetical high-density LMS system would not present an interference risk to Part 15 devices greater than the inherent risk of interference they might receive—from other Part 15 devices.

2. Assumptions regarding the technical analysis parameters of LMS systems.

WaveRider states that it "can find no ... assessment of how the proposed LMS network parameters will affect the performance of WaveRider's LMS4000 system." It was not the intent of the White Paper to perform an exhaustive analysis of every Part 15 system in commercial operation. Indeed, the first page of the White Paper clearly states: "The technical framework

described in this paper, and the specific interference scenarios presented, is intended to be illustrative, using reasonable assumptions about technical parameters and deployment scenarios.” In the paper, we analyzed LMS interference potential into a representative array of Part 15 devices, including WLAN and Ricochet (in urban settings) and automatic meter readers and cordless telephones (in suburban settings).

One of those scenarios — the Ricochet system — provides a reasonably close approximation to the WaveRider system.² In the Ricochet scenario, other Part 15 devices were

² Other *ex parte* comments, such as those filed on June 12, 2003, by SchlumbergerSema, Inc. (SSI), likewise have raised questions regarding the parameters applied in the White Paper. Frankly, this kind of debate on the conservative set of assumptions used in the White Paper simply illustrates the difficulty that would face Progeny and any other company seeking to develop LMS in this band under the field testing regime required by Section 90.353(d) of the FCC’s rules. The licensee must prove the negative on a literally infinite range of assumptions. Having said this, to clarify the record, Progeny has reviewed SSI’s critique and responds accordingly.

SSI’s first objection to the White Paper analysis is that LMS transmitters have direct line-of-site to the SSI receivers—not indirect as assumed in the paper—and therefore the SSI receivers will suffer greater interference than predicted. This statement is simply not correct. Progeny demonstrates that in a “worst case,” high-density LMS system design, there will be one LMS transmitter every 13 square miles in suburban areas. SSI points out they will have 65 to 190 AMR receivers in the same area. LMS transmitters are sparsely placed in relation to AMR receivers, with an LMS transmitter three miles or more from an AMR receiver, on average. Given this geometry, it is entirely reasonable for Progeny to use a non-line-of-sight propagation model for its interference analysis. Moreover, Progeny was explicit in stating that its analysis was performed on a worst case, high density LMS design to allow conservative analysis; in practice, LMS base stations would be much more sparse, further reducing potential interference.

SSI’s second objection related to the height of its pole top receiver — 20 to 30 feet — in relation to the height of a typical LMS receiver (6 feet) in the hypothetical LMS network. SSI claims that because its receivers are higher than LMS receivers, they will be susceptible to interference. In fact, Progeny evaluated an interference scenario for pole-top receivers, using the Ricochet system as a representative system. In the analysis, Ricochet pole-top receivers are assumed to be mounted 15 feet above ground level. The analysis demonstrated that LMS posed far less risk to the Ricochet system than other Part 15 devices operating in the area. The pole-top height in the study (15 feet) is close enough to the pole-top height used by SSI for the analysis to be valid. SSI could have done the analysis themselves on their slightly higher poles, but they did not, perhaps because they knew there would be no material difference in the received interference level.

SSI’s final objection relates to the sensitivity of its receivers, and their risk from a high duty-cycle LMS application. To read SSI’s objections in this area, one would wonder whether its product is suitable for any use in unlicensed spectrum. SSI only provides one figure of merit for its receiver — its noise threshold — which is indeed low. An AMR receiver with this level of

found to pose a greater threat to Ricochet than the hypothetical LMS system Progeny postulated. Progeny went to great lengths to enumerate its assumptions and methods of calculation, so that companies such as WaveRider could perform the analysis themselves, applying and adapting the data and criteria for their specific equipment. WaveRider apparently did not elect to perform such an analysis and report its results.

WaveRider goes on to question the use of a 16 dBi sectored antenna in the hypothetical LMS network. WaveRider states that “at least one” antenna manufacturer recommends against using such an antenna in point-to-multipoint systems. It then goes on to state that “any uncertainty on this point undermines Progeny’s conclusions.” WaveRider engages in a dangerous game of semantics, building a damning conclusion on a vague and unsubstantiated foundation. Which antenna manufacturer made this recommendation? Certainly not Decibel Products, a leading manufacturer of antennas for exactly the purpose described in the White Paper (wireless voice networks in which mobile receivers employ low-gain omni-directional antennas), and whose specification sheet we included as an attachment to the White Paper. In point of fact, 16 dBi sectored antennas are among the most common in the cellular industry, and the use of this antenna is entirely consistent with the White Paper’s objective of analyzing the effects of a high-density, cellular-like LMS network. WaveRider’s unfounded allegations, especially in the absence of any analytical contribution, add little to this record.

WaveRider concludes its arguments in this area by stating that LMS equipment characteristics are incompatible with the need for flexible use of the spectrum. In particular, WaveRider suggests that as LMS bandwidth demands increase, the LMS receiver noise threshold will rise above -105 dBm, causing greater and greater levels of interference. These claims, in both their general and specific forms, are entirely specious. The equipment specifications provided in the paper represent typical industry values and were provided only so that interference calculations could be performed in a method that was clear and transparent. There was no assumption about special coding or digital signal processing algorithms that would, in practice, help the equipment be a “good neighbor” to other equipment in the band.

sensitivity would be highly vulnerable to interference from other Part 15 devices. The reason SSI’s AMR system is not crippled today is because it employs techniques such as spread-spectrum modulation and perhaps digital signal processing that make it more robust.

These same techniques, of course, would protect the SSI system from interference by an LMS system. SSI does not publish these radio specifications, and as a result, Progeny has no way of conducting an analysis of their susceptibility. SSI, on the other hand, could have performed its own analysis using the White Paper assumptions, but again it elected not to report any analytical results. SSI expressed alarm and conviction that Progeny intends to deploy a high duty-cycle voice network in the LMS band despite Progeny’s clear statement that it intends to deploy spread-spectrum, packet-based technology. Progeny made clear that it utilized a cellular-like voice system in the White Paper for analysis purposes only, to show the effects of a high-density LMS deployment. Instead of responding to the White Paper in an analytical and construction fashion, SSI has done nothing more than distort the analysis for its own purposes.

LMS equipment, like all equipment operating in the 902-928 MHz band, must be inherently designed for flexible use in a high-interference environment, with receiver sensitivity being only one of many contributing parameters. The White Paper explicitly states: “Devices deployed in this band are designed to tolerate such an [uncontrolled] environment and may employ frequency agility to avoid interfering sources.” WaveRider’s particular focus on the LMS receiver noise threshold is especially ironic, since WaveRider’s flagship product (the LMS4000) has a 19 dB higher noise threshold than the envisioned LMS receiver, meaning that the WaveRider system is causing significantly greater interference in the shared band than the worst-case LMS system would.

3. *Misapplication of the COST-WI model.*

WaveRider argues that the White Paper applies the COST-WI propagation model outside the acceptable range of some of its parameters. The table below summarizes the parameters in question, with the relevant values italicized:

Parameter	Range of Valid Values	Values Used in White Paper
Frequency	800 – 2000 MHz	915 MHz
LMS Transmitter Height	4 – 50 meters	<i>61.0</i> meters (urban) 45.7 meters (suburban)
LMS Receiver Height	1 – 3 meters	1.8 meters
Horizontal distance between transmitter and receiver	20 – 5000 meters	<i>18.29</i> meters 21.24 meters 24.38 meters

WaveRider is correct in pointing out that these values are outside the range proven for the propagation model. Five scenarios out of the twelve analyzed in the White Paper made use of these out-of-ranges. Progeny recalculated these interference scenarios, adjusting the LMS transmitter height from 61 meters to 50 meters, and the horizontal distance between the transmitter and receiver from 18.29 meters to 20 meters. The resulting interference levels appear in ***bold italic*** in the table below. While the interference levels did change modestly, it is evident that the high-density LMS system still provides less interference than other Part 15 devices.

LMS Compatibility Study		
Urban Scenarios <i>LMS Antenna Height = 164 Feet (Rooftop)</i> <i>Height of Neighboring Buildings = 150 Feet</i> <i>Road width = 50 Feet</i> <i>Distance Between Buildings = 100 Feet</i>		
WLAN		
WLAN Element Receiving Interference	Interfering Signal Strength	
	Part 15 Device <i>1 floor directly below</i> <i>ISM Propagation</i> <i>Tx power 12 dB below max allowed</i>	LMS Antenna <i>Adjacent Rooftop</i> <i>COST-WI LOS Propagation</i>
WLAN Access Point <i>20 feet from building exterior</i> <i>100 feet above ground level</i>	-21.2 dBm	-43.29 dBm
WLAN Workstation <i>10 / 15.7 feet from building exterior</i> <i>100 feet above ground level</i>	-31.0 dBm	-45.17 dBm
WLAN Workstation <i>30 feet from building exterior</i> <i>100 feet above ground level</i>	-31.0 dBm	- 43.51 dBm
Ricochet		
Pole Tope Receiver Receiving Interference	Interfering Signal Strength	
	Part 15 Device <i>500 feet away (line of sight)</i> <i>35 feet above ground level</i> <i>COST-WI LOS Propagation</i> <i>Tx power 12 dB below max allowed</i>	LMS Antenna <i>500 feet away (non-line-of-sight)</i> <i>Rooftop Mounted</i> <i>COST-WI NLOS Propagation</i>
Pole Top Receiver <i>15 feet above ground level</i>	-59.58 dBm	-62.95 dBm
Suburban Scenarios <i>LMS Antenna Height = 150 Feet (Monopole)</i> <i>Height of Neighboring Buildings = 35 Feet</i> <i>Road width = 60 Feet</i> <i>Distance Between Buildings = 120 Feet</i>		
Part 15 Devices		
Part 15 Device Receiving Interference	Interfering Signal Strength	
	Part 15 Device <i>Mounted on roof of shopping mall</i> <i>0.1 mile away (non-line-of-sight)</i> <i>50 feet above ground level</i> <i>COST-WI NLOS Propagation</i>	LMS Antenna <i>Monopole mounted</i> <i>0.5 mile away (non-line-of-sight)</i> <i>150 feet above ground level</i> <i>COST-WI NLOS Propagation</i>
Automatic Meter Reader <i>Hand held device</i> <i>6 feet above ground level</i>	-57.1 dBm	-58.5 dBm
Cordless Telephone <i>Located in private home</i> <i>15 feet above ground level</i>	-63.8 dBm	-65.9 dBm

4. *Alleged dismissal of mobile LMS as a source of interference.*

WaveRider claims that the White Paper dismisses the possible risk of LMS mobile devices. This claim is simply false. Section 3.2.5 of the White Paper acknowledges LMS mobile devices as a potential cause for interference, but states that because of their lower power and

mobility, these devices produce sporadic and geographically diverse interference – precisely the kind of interference that Part 15 devices are designed to tolerate. The White Paper was even-handed in its choice of a hypothetical LMS system for analysis: a cellular-like system with high-power base stations and low-power mobile devices. It would be unrealistic and unreasonable to expect Progeny to postulate a system with high-power base stations and high-power receivers; such a system would compound multiple worst-case scenarios and would have no practical use in commercial service.

5. *The interference scenarios in Section 3 of the White Paper are flawed.*

The principal argument put forth by WaveRider is that the wrong type of antenna was used in the hypothetical LMS system, rendering the interference analysis incorrect. WaveRider seems to be indicating, albeit obliquely, that a point-to-multipoint antenna should have been chosen rather than the 16 dBi sectored antenna. This is essentially a restatement of its second argument, above. WaveRider does not suggest an alternative antenna specification, nor does WaveRider show the results of any of its own analysis, and as a result its argument is completely unsubstantiated. Allowing the benefit of the doubt, perhaps WaveRider is referring to a fixed point-to-multipoint system (in which the transmitter and all the receivers are in fixed locations). This type of system might indeed merit a different antenna design, but the worst case hypothetical LMS system presented in the White Paper is a *mobile voice* system, for which the selected antenna is an accepted industry norm.

WaveRider concludes by stating its puzzlement that Progeny performed an interference calculation on the Ricochet system and not the WaveRider system. In the view of Progeny, both Ricochet and WaveRider were equally represented in the proceedings on this matter at the time the White Paper was submitted (roughly one year ago). The systems are roughly comparable for the purposes of this analysis. As stated above, the White Paper clearly spells out its basic assumptions and WaveRider is encouraged to use its own equipment specifications in conjunction with the White Paper framework to create another assessment of the interference risk.

To sum up, Progeny remains confident in the unchallenged conclusion of the White Paper: that even a high-density LMS system does not present an interference risk to Part 15 devices that is greater than the inherent risk of interference from other Part 15 devices.